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Evaluation of the Prototype Position Data Analysis Job Aid (PDAT-JA)

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for

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The Position Data Analysis Job Aid (PDAT-JA) software is a product of research accomplished during earlier phases of the Military Occupational Specialty (MOS) restructuring research and development program conducted by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). The software, released for demonstration in December 1990, automates much of the position data analysis process performed during MOS restructuring. This report (1) provides a synopsis of the development of PDAT-JA, (2) defines the role of the software in the MOS research and development program, and (3) provides the results of the operational evaluation of the prototype software.

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EVALUATION OF THE PROTOTYPE POSITION DATA ANALYSIS JOB AID (PDAT-JA)

EXECUTIVE SUMMARY

Requirement:

The Position Data Analysis Job Aid (PDAT-JA) software is a product of research accomplished during earlier phases of the Military Occupational Specialty (MOS) restructuring research and development program conducted by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). The software, released for demonstration in December 1990, automates much of the position data analysis process performed during MOS restructuring. The research requirement was to conduct a user evaluation of the prototype PDAT-JA to identify benefits or problems associated with its use, as well as any needed or desirable changes to either the software or the user's manual.

Procedure:

The work underlying this effort involved three steps. First, evaluation procedures were developed to collect operational data on the PDAT-JA software. Next, PDAT-JA was installed at the evaluation sites, and software evaluators were identified and briefed. Finally, evaluation data were collected and analyzed, and results, conclusions, and recommendations were documented. The primary focus of the evaluation was to identify improvements that PDAT-JA contributed to the position data analysis process and to obtain evaluator recommendations for software modification.

Findings:

This research note identifies two primary findings concerning the prototype PDAT-JA software:

1. PDAT-JA enhances the MOS analyst's ability to perform position data analysis by substantially improving accuracy and reducing the time required for analysis by as much as 72 to 95 percent.

2. Modifications to PDAT-JA are needed to augment the software's capability to assist the MOS analyst in performing position data analysis.

Utilization of Findings:

The findings indicate that, with further modification, PDAT-JA can significantly reduce the time required to perform position data analysis. A selected subset of these modifications will be made and a revised user's manual will be prepared. The new PDAT-JA software and user's manual will be distributed to the personnel proponent offices in the Army.

EVALUATION OF THE PROTOTYPE POSITION DATA ANALYSIS JOB AID (PDAT-JA)

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EVALUATION OF THE PROTOTYPE POSITION DATA ANALYSIS JOB AID (PDAT-JA)

Introduction

This report documents an evaluation of the prototype Position Data Analysis Job Aid (PDAT-JA) based on its initial use during May-June 1991. The report provides a brief description of the software, discusses the role of PDAT-JA in the Military Occupational Specialty (MOS) restructuring research and development program, documents results of the software's test and evaluation, and provides recommended software modifications.

The purpose of this report is to document the extent to which PDAT-JA supports the personnel proponent analyst in performing position data analysis. The primary focus of the report is to examine the "value added" to MOS restructuring by the prototype software.

Background

The PDAT-JA software is a product of research conducted during earlier phases of the Army Research Institute's (ARI) MOS restructuring research and development program. Akman & Haught (1990) identified the position data analysis phase of MOS restructuring as one of the more critical and demanding steps of operations-based MOS restructuring.

During follow-on research work, specifications for PDAT-JA were developed to provide a description of personal computer (PC)-based analytical aids that could be used to support position data analysis (Haught & Akman, 1990). This effort resulted in a demonstration that a PC-based analytical aid could be developed that would improve the overall effectiveness of the Army's personnel proponent agencies.

Based on the specifications, prototype software for PDAT-JA was developed for ARI demonstrating the technical and operational feasibility of developing software capable of supporting the more difficult segments of MOS restructuring performed by the personnel proponent (Haught, Schniebolk, & Akman, 1990). The software, released for demonstration in December 1990, automates much of the position data analysis process.

Overview of the Report

This report consists of five sections. The first section provides a description of position data analysis and defines the role of PDAT-JA in the MOS restructuring research and development program.

The second section describes the procedure used in evaluating PDAT-JA. This section identifies the standards and constraints that influenced the design of the software. The methodology used to evaluate the prototype software is also described.

The third section presents the results of the PDAT-JA software evaluation. The section presents a comparison of position data analysis performed in the manual mode and the performance improvements in each step of analysis resulting from the introduction of PDAT-JA. Also provided in the section is a summary of overall time savings for each evaluation subject based on comparing analysis performed with PDAT-JA and that analysis performed manually.

In the fourth section, evaluator-recommended modifications to the PDAT-JA software are reviewed and analyzed. From analysis of evaluator recommendations, a final list of recommended software modifications is identified.

The final section discusses feasible future evaluation and development efforts for the PDAT-JA software. This section presents a case for continued evaluation and full-scale development of PDAT-JA.

PDAT-JA and MOS Restructuring

The purpose of this section is to provide a synopsis of the development of PDAT-JA and define the role the software plays in the MOS restructuring research and development program. The section also defines the scope of the position data analysis phase of MOS restructuring and furnishes a description of the PDAT-JA software.

Overview of Position Data Analysis

The position data analysis phase of MOS restructuring is a detailed analysis of the authorized MOS positions that are affected by changes in doctrine, policy, organizations, or the introduction of new or modified equipment systems. The results of this analysis provide the proponent with a broad overview of the relative health of the MOS, types and geographic locations and organizations where the MOS is authorized, total authorized positions, space imbalanced MOS (SIMOS) implications, grade structure needs, and combat probability of the MOS.

Position data analysis requires manipulating and analyzing large volumes of MOS data. Currently, most personnel proponent agencies are performing position data analysis in a "stubby pencil" mode consisting of (1) manual sorting of The Army Authorization Documents System (TAADS) MOS data, (2) performing "tick mark" counts of MOS data based on several different analysis criteria, (3) manually applying standards of grade to the MOS data by marking up hard copy TAADS documents, (4) developing reports based on the results of counts, and (5) manually applying the average grade distribution matrix (AGM) to MOS data.

Typically, each step of position data analysis may be performed as few as two times (once on current TAADS data and once on modified data) and as many as six times during the process of an MOS restructuring action. Because position data analysis is so tedious and time consuming, this phase of MOS restructuring can take two to six months to perform, depending on the size of the MOS being analyzed.

The Role of PDAT-JA in the MOS Restructuring Process

MOS restructuring occurs in two phases: requirements-based and operations-based. In the requirements-based phase, restructured MOSs are developed in response to various triggering actions such as the acquisition of new equipment or doctrinal changes, among other possibilities. If approved, a series of analyses is required in order to implement the MOS changes into the Army's personnel system; this constitutes the operations-based phase of restructuring. Position data analysis is one of

the operations-based analytical steps, albeit very time consuming and difficult as currently manually performed.

The Military Occupational Specialty (MOS) Restructuring Research and Development Blueprint (Steinbach, Akman, & Haught, 1990) identified development of a position data analysis tool as an important step in improving the operations-based MOS restructuring process. The rationale was that such a tool would greatly reduce the time and resources required for position data analysis while significantly improving its accuracy. The importance of such a tool is founded in critical requirements for position data in subsequent steps in operations-based restructuring including personnel data analysis, recruiting analysis, and pre- and post-standards of grade authorization (SGA) development and analysis.

PDAT-JA was designed to improve position data analysis by:

1. Significantly reducing the time and manpower required;

2. Increasing data accuracy and validity;

3. Providing the ability to more efficiently manage the data to be analyzed in an MOS restructuring action; and

4. Providing an audit trail capability.

In sum, PDAT-JA represents a significant enhancement in the analytical tools which are available to support the analysis required to implement MOS restructurings. It offers a more structured, verifiable means for conducting position data analysis.

Software Description

PDAT-JA is a PC-based prototype software system designed to improve operations-based MOS restructuring by reducing the burdens of manually analyzing the large volumes of data involved in position data analysis. The prototype software was developed specifically to support the analysis process by utilizing the capabilities of the Army standard PC system to provide the MOS analyst with automated sorting of TAADS data and supplying information on MOS environmental, structural, and deployment data. PDAT-JA is also designed to provide the analyst with the capability to make revisions to TAADS through computer generated worksheets, generate reports, and make comparisons between original TAADS data and data modified by the analyst.

The PDAT-JA software was developed using an off-the-shelf "shell" software. The software is distributed in a run-time

version of the FOXPro data base management system and dGE graphic display system. At the current stage of development, PDAT-JA can support TAADS data base downloading, analysis, and revision of up to three enlisted MOSs. Presently, the software will accept TAADS data for active Army components only. Based on the results of test and evaluation and the overall success of the prototype software, a fully operational software system can be developed with the capacity to support analysis of officer, warrant officer, civilian, and reserve component data as well.

PDAT-JA System Evaluation Procedure

The objective of the prototype system evaluation is to assess how well PDAT-JA supports the personnel proponent analyst in performing position data analysis. Three areas are considered in this evaluation:

1. Assessing performance improvement in position data analysis resulting from the introduction of PDAT-JA;

2. Assessing the user-system interface and software acceptance; and

3. Assessing the adequacy of the PDAT-JA User's Manual.

The primary focus of this evaluation is to assess the "value added" by automating portions of position data analysis through the PDAT-JA software. Emphasis is also placed on the identification of improvements that can be made by modifying the current prototype as opposed to those that would best be accomplished by undertaking additional software development. The evaluation of PDAT-JA will identify those modifications that maximize the quality and capability of the existing software.

Since PDAT-JA was developed as a research product, a number of design criteria and constraints were defined as a guide for developing the prototype software. The criteria provide a basis for the data manipulation and data reporting capability of the software and summarize the principal features of position data analysis. The constraints identify the operating environment for PDAT-JA. The evaluation procedure is designed to evaluate PDAT-JA against these criteria and constraints.

Criteria

The following are a list of the primary design criteria:

1. The software must provide the capability to sort TAADS data and provide MOS summary reports based upon predefined position data criteria;

2. The software must provide the capability to manipulate TAADS data and develop additional data for assessment of the environment, structure, and deployment of MOSs in support of position data analysis;

3. The software must provide the capability to generate modified MOS data based on user input

and compare the original MOS data with the modified data; and

4. The software must assist the MOS analyst in performing grade structure analysis by supporting the assessment of career progression and stability of current and proposed MOS structures.

Constraints

The following is a list of the software constraints:

1. The software must operate on Army standard PC equipment, e.g., Zenith Z-248 PC with one 5-1/4" floppy disk drive, one 20 megabyte hard drive, CGA or VGA graphics adapter, and the Alps 2000 dot matrix printer (or equivalent);

2. The software must be exportable and nonproprietary, not requiring the government to purchase additional software packages, and must operate on MS-DOS computer hardware as described above;

3. Because PDAT-JA was constrained to operating on the Army standard system, the software's data import and data manipulation capability was deliberately limited to three MOS with a total of 5000 or fewer positions.

The limitation of the number of positions that can be analyzed is a function of the storage capacities of usually available computer equipment and not the PDAT-JA program. PDAT-JA itself can handle any number of positions. Work is currently being performed to allow for the increase in capacity of currently generally available equipment.

Method

To obtain a reliable evaluation of the PDAT-JA software requires that the interaction of all the system components (human, hardware, and software) be assessed in an operational environment and that data be obtained during actual systems operation. To satisfy these needs, the method described below addresses the following three critical areas:

1. Software Installation;

2. Selection of Participants; and

3. Standardized Evaluation Procedures.

Software installation. PDAT-JA software was installed at the U.S. Army Signal Center and School, Fort Gordon (FG), Georgia, the U.S. Army Engineer School, Fort Leonard Wood (FLW), Missouri, and the U.S. Army Ordnance Center and School, Aberdeen Proving Ground (APG), Maryland, for the purpose of software evaluation. This provided a sufficient number of test users for the assessment of the capability and utility of the prototype software. FLW and APG participated as active evaluation participants while FG provided input through a peer review process.

Selection of participants. Selection criteria were developed to describe the expected users of the fielded version of PDAT-JA. Evaluation participants were selected against these criteria. The biographical data were recorded for all participants.

Experience. Evaluation subjects were required to have at least one year of experience as an MOS analyst in a personnel proponent agency and have completed a minimum of one MOS restructuring action. The analysts were also required to demonstrate a good understanding of the MOS restructuring process and have a good working knowledge of the acronyms used in the personnel proponent community.

MOS or civilian job series. To be selected as a participant, military analysts were required to be in the ranks of Staff Sergeant to Sergeants Major and civilian analysts were to be in paygrades GS-07 to GS-12. Military analysts could hold any MOS within the CMF they were responsible for. However, the only civilian job series that were utilized in the evaluation were job series 241, Force Integration Analyst; 243, Force Integrator; and 301, Military Occupational Analyst.

Profile of Evaluation Participants. Two evaluation participants consisting of enlisted personnel were selected from members of the personnel proponent offices at both the Engineer and Ordnance Schools. All personnel met the criteria for selection and the group consisted of wide ranging military backgrounds. The MOSs represented by the evaluators included MOSs 51T, 63H, 63Z, and 81Z. A profile of this group is shown in Table 1. All participants were briefed on the purpose of the software evaluation and their role as participants.

Standardized Evaluation. The evaluation consisted of two stages. The first stage was an orientation briefing; the second was the user evaluation of the software. Both are described below.

Orientation briefing. All personnel selected for participation in the evaluation were provided an orientation briefing. This was accomplished at the time the software was installed at the selected sites. The orientation briefing was

Table 1

Profile Data for Evaluation Participants

Number of Evaluators:	4
Average Grade:	Sergeant First Class
Average Time as Analyst:	32 Months
Average Number of Actions Completed:	5

MOSs Represented by Analysts:

51T	Technical Engineering Supervisor
63H	Track Vehicle Repairer
63Z	Mechanical Maintenance Supervisor
81Z	Topographic Engineering Supervisor

comprised of (1) an overview of the PDAT-JA software's design and system specifications, (2) an overview of the evaluation, (3) a discussion of the roles and responsibilities of the evaluation participants, and (4) an overview of the evaluation methodology.

User evaluation. Following the evaluation briefing, selected MOS analysts used the PDAT-JA software for three to four weeks. During this time, the analysts were required to perform a position data analysis scenario designed to exercise all procedures identified in the PDAT-JA User's Manual. The scenario was broken down into seven tasks that were designed to demonstrate the capability of the end user to perform all functions specified in the system software criteria. The scenario was arranged in the logical sequence of position data analysis. A copy of the scenario is at Appendix A.

Upon completion of the scenario, the analysts provided subjective assessments of the software's contribution in terms of (1) reducing data manipulation requirements, (2) increasing data accuracy and reliability, and (3) increasing time spent on analysis rather than data manipulation. Additionally, the participants were asked to evaluate the software in terms of general system design, overall acceptability, data display, data entry procedures, and user-control compatibility. A questionnaire was provided to the analysts to support their evaluation of the software. See Appendix B for a copy of the questionnaire used to obtain these data concerning PDAT-JA assisted position data analysis.

To establish a baseline for measurement of performance improvements, data were gathered on the accomplishment of position data analysis in the current manual mode. A questionnaire was used to solicit input in terms of relative time spent on each step of analysis, degree of difficulty, average time spent, accuracy and reliability of analyst produced data, as well as other aspects of analysis performance. A copy of the questionnaire used to evaluate manual position data analysis is provided in Appendix C.

The analysts were not required to fill out the questionnaires. The questionnaires were provided to the analysts to furnish them with a basis from which to perform their assessments. Once the software was installed and operated at the evaluation sites for three to four weeks, interviews of the evaluation subjects (selected MOS analysts) were conducted and the questionnaires completed by the author.

PDAT-JA Evaluation Results

The results of the PDAT-JA evaluation are presented in this section. Improvements in performance resulting from introduction of PDAT-JA are presented for each analytical step of position data analysis. Additionally, the results of PDAT-JA assisted position data analysis are discussed in terms of the software's overall contribution to improving analytical capabilities.

Performance Improvements

Baseline evaluation data were gathered to develop a depiction of position data analysis as performed in the manual mode. Since a large majority of personnel proponents are currently performing position data analysis manually, these data are representative of the level of effort being expended on this type of analysis at most branch proponent schools. These data provide the baseline from which PDAT-JA's contribution to improving mission accomplishment is evaluated.

Baseline data were gathered from four evaluation subjects; two at APG and two at FLW. FG did not provide baseline information as position data analysis is semi-automated through the use of dBase III+ at this agency. Since the universe from which to gather these data is small and because a wide variance in the responses to some of the questions existed, the data gathered through this evaluation are treated as anecdotal rather than statistically representative. Accordingly, the baseline data are used only to make comparisons between the individual analyst's performance of position data analysis in a manual mode and analysis supported by PDAT-JA. Notwithstanding this limitation, based on the author's personnel proponent experience over nine years, the findings are generally representative of personnel proponent experience throughout the Army.

Position data analysis consists of several analytical steps. Each step has a distinct purpose and requires specific data to be gathered. Therefore, the evaluation of position data analysis as currently performed is broken down into the following steps or categories:

1. Application of the Army's Average Grade Distribution Matrix (AGM);

2. Additional skill identifier (ASI) data collection and analysis;

3. Specialty qualification identifier (SQI) data collection and analysis;

4. Major Army command (MACOM) data collection and analysis;

5. Modified table of organization and equipment (MTOE) versus table of distribution and allowances (TDA) data collection and analysis;

6. Continental United States (CONUS) versus outside the continental United States (OCONUS) data collection and analysis; and

7. Modifications to TAADS documents.

The baseline or manual mode data are compared to the data gathered on PDAT-JA assisted position data analysis. The data are compared in terms of the relative time spent gathering data, the accuracy and reliability of data, and the frequency of data collection for each category. Ratings by the analysts on the accuracy and reliability of data were based on the following scale:

1 - Very Low Accuracy and Reliability
2 - Low Accuracy and Reliability
3 - Less Than Average Accuracy and Reliability
4 - Average Accuracy and Reliability
5 - More Than Average Accuracy and Reliability
6 - High Accuracy and Reliability
7 - Extremely High Accuracy and Reliability

Figure 1 summarizes the baseline data collected on position data analysis as performed in the manual mode. As depicted in the chart, approximately 59 percent of the analyst's time is spent modifying TAADS by making pencil changes to a hard copy TAADS report document. Additionally, almost 18 percent of the analyst's time is spent gathering MOS grade structure data in order to determine if the grade distribution of the MOS falls within the norms of the Army's Average Grade Distribution Matrix after application of a new or revised SGA. The remaining 23 percent of the analyst's time is spread between gathering and evaluating ASI and SQI data, MACOM data, MTOE versus TDA data, and CONUS versus OCONUS data.

Figure 2 depicts the total time each evaluation subject spends performing position data analysis manually. As represented by the chart, three of the four subjects estimated the position data analysis process required between 350 to 400 hours to complete an MOS merger or restructuring action consisting of approximately 5000 authorized positions. However, one subject felt that the total data gathering and analysis process required over 1100 hours to complete. What is interesting about this finding is that not only was this subject's appraisal of the time required for performing various analytical steps higher than the others, the subject also performed each step more often. When asked about this, the subject stated that performing position data analysis in the manual mode was very time consuming and mistake prone.

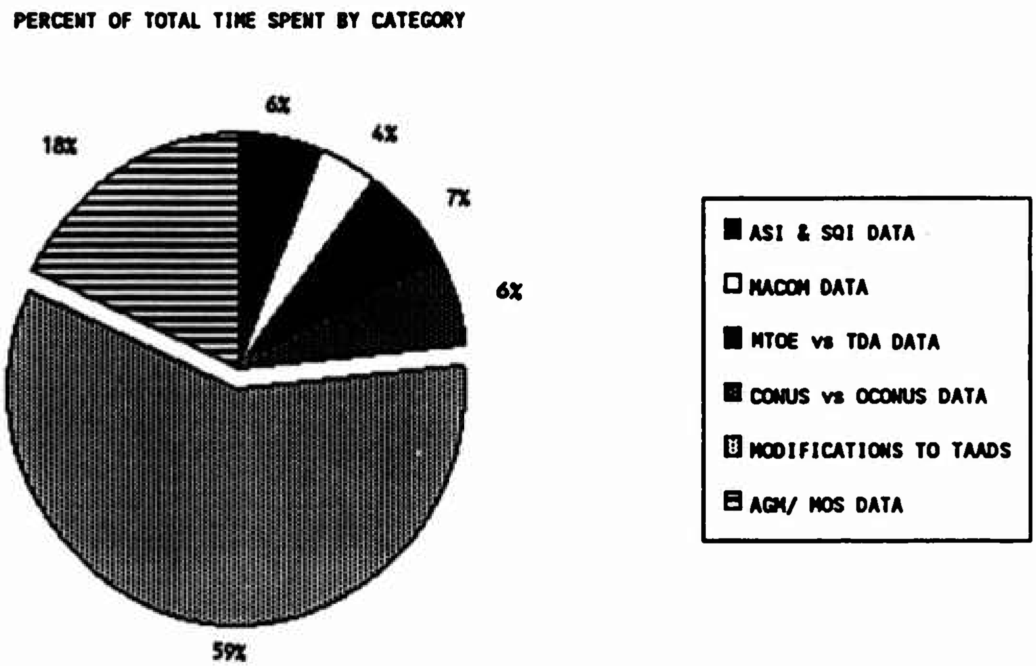

Figure 1. **Summary of total time spent on position data analysis by category (manual mode).**

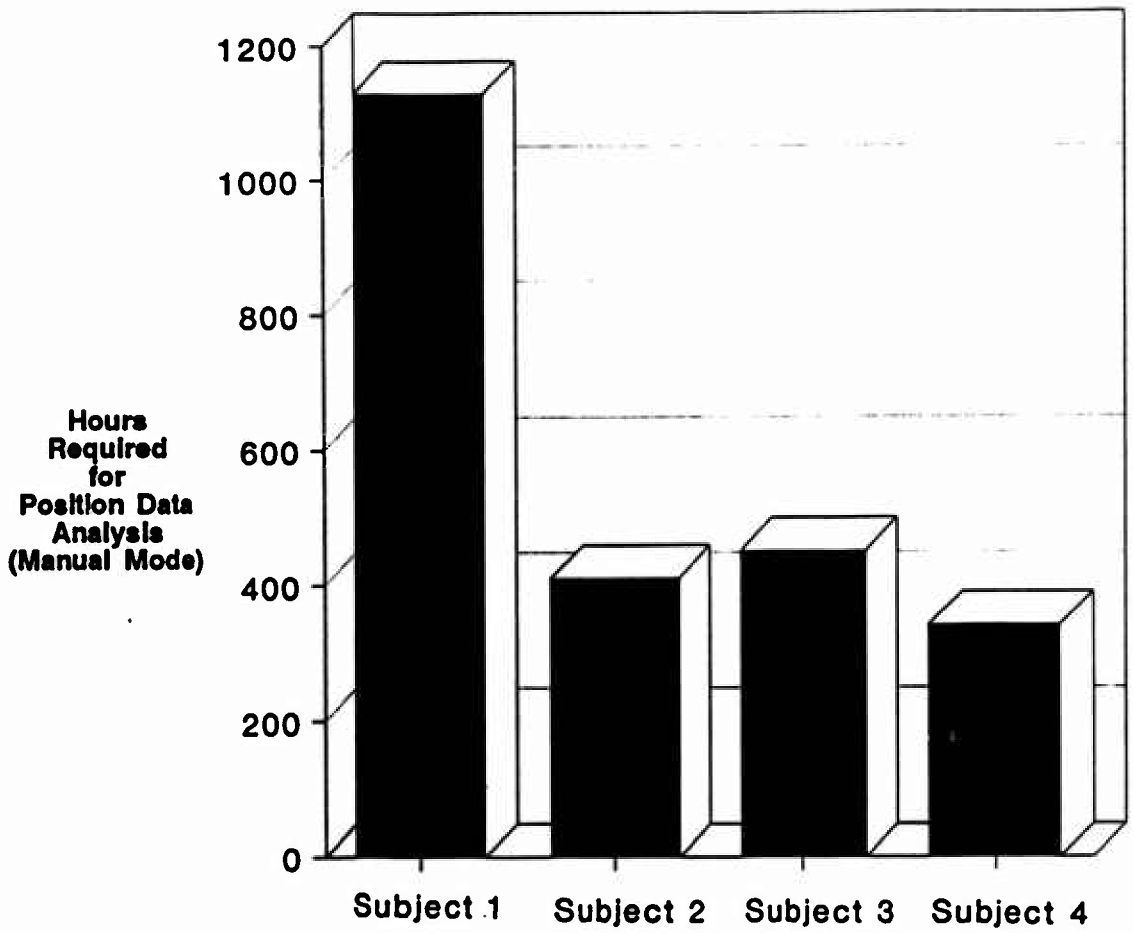

Figure 2. Estimated time spent on position data analysis by each evaluation subject (manual mode).

This subject's position was that all mistakes required identification and correction before moving to the next step of analysis. Therefore, an analysis step can and usually does require considerable time and multiple iterations to insure completeness and correctness. He stated that many MOS analysts subscribed to the notion that close is good enough, and therefore, did not adequately perform all the steps required in position data analysis.

Application of the AGM. All evaluation participants performed this step of analysis both on original TAADS data and on data changed by the analyst after application of a new or revised SGA. As depicted in the Pre PDAT-JA portion of Table 2, the process of applying the AGM to an MOS structure was not in itself time consuming. The time required to apply the AGM ranged from .16 hours (10 minutes) to .50 hours (30 minutes). However, gathering data, especially after application of a new or revised SGA required from 15 to 80 hours to perform. When these time requirements are multiplied by the number of times each analyst must revise, apply, and perform the counts on MOS data before an acceptable SGA can be developed, the requirement becomes significant. The total time required for the AGM process ranged from 30 to 241 hours. The accuracy and reliability of data gathered manually for this analysis ranged between 3 (less than average) and 5 (more than average).

All subjects also performed this analysis step using the PDAT-JA software. As depicted in the Post PDAT-JA section of Table 2, the time required to apply the average grade matrix was reduced to .05 hours (3 minutes) or less. The time required to make counts and gather data after application of a new or revised SGA was also reduced from 15-80 hours to 3-5 hours. The total required for the AGM process was significantly decreased from a range of 30-241 hours in the manual mode to 6-15 hours using PDAT-JA. On average, the percent of time saved by automating this step of position data analysis is 87 percent. The accuracy and reliability of data gathered and analyzed through the software was rated as 7 (extremely high).

ASI data collection and analysis. Three out of the four evaluation participants said they gathered and analyzed ASI data. The remaining participant did not perform this function because only two low density ASIs were associated with the MOSs for which he had responsibility. The analyst stated that no work at all is done on either ASI unless a specific issue related directly to the ASI comes up. The Pre PDAT-JA chart on Table 3 shows ASI data are collected at least twice during position data analysis and the time spent on this process ranged from 10 to 22 hours. The total time required to perform this analysis step fluctuated from 20 to 44 hours for each analyst. The accuracy and reliability of these data were rated as 4 (average).

Table 2

Application of AGM

APPLICATION OF AGM	**PRE PDAT-JA** SUBJECT 1	SUBJECT 2	SUBJECT 3	SUBJECT 4
Perform Procedure? (Y/N)	Y	Y	Y	Y
Time (Hrs) AGM Application	.33	.25	.16	.50
Time (Hrs) Data Gathering	80	80	15	40
Number of Times	3	2	2	2
TIME SPENT	241	160	30	80
Rate Data Accuracy (1 - 7)	3	4	5	3

APPLICATION OF AGM	**POST PDAT-JA** SUBJECT 1	SUBJECT 2	SUBJECT 3	SUBJECT 4
Perform Procedure? (Y/N)	Y	Y	Y	Y
Time (Hrs) AGM Application	.02	.05	.01	.03
Time (Hrs) Data Gathering	3	5	4	4
Number of Times	2	3	2	3
TIME SPENT	6	15	8	12
Rate Data Accuracy (1 - 7)	7	7	7	7

Table 3

ASI Data Collection and Analysis

	PRE PDAT-JA			
ASI DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	N	Y
Number ASIs	3	3	2	6
Time (Hrs)	20	22		10
Number of Times	2	2		2
TIME SPENT	40	44		20
Rate Data Accuracy (1 - 7)	4	4		4

	POST PDAT-JA			
ASI DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	Y
Number ASIs	3	3	1	2
Time (Hrs)	.50	.50	.03	.04
Number of Times	2	2	1	2
TIME SPENT	1	1	.03	.08
Rate Data Accuracy (1 - 7)	7	7	7	7

All analysts performed ASI data analysis using PDAT-JA. As depicted in the Post PDAT-JA chart, the time spent on this portion of analysis ranged from .03 to .50 hours (2 to 30 minutes). Based on the time spent by Subject 2, this is a reduction in time of up to 21½ hours from the manual analysis mode. On average, time savings for ASI data analysis averaged 99 percent. Data accuracy and reliability increased from 4 (average) to 7 (extremely high).

SQI data collection and analysis. Again, three of four evaluation participants indicated that they gathered and analyzed SQI data. One participant did not gather these data because he felt the data were unimportant to the position data analysis process since the MOSs for which he was responsible had only two SQIs and the densities of SQI positions were very low. The Pre PDAT-JA chart on Table 4 indicates that SQI data are collected twice during this analysis process. The total time required to perform this step ranged from 6 to 10 hours. The rated accuracy and reliability of SQI data ranged from 3 (less than average) to 6 (high).

Three of four subjects performed SQI data analysis using PDAT-JA. The Post PDAT-JA chart shows the time required to perform this step of analysis was reduced to between .06 hours (4 minutes) and two hours. Overall time savings using the software for SQI analysis averaged 89 percent. Data accuracy and reliability increased to 7 (extremely high)

MACOM data collection and analysis. Only one subject indicated that he collected and analyzed MACOM data. The remaining subjects stated that because of time constraints this MACOM data analysis is not completed unless a MACOM requested that a specific issue be addressed. As depicted in the Pre PDAT-JA chart on Table 5, one analyst reports that the total time required for this step is 20 hours. Accuracy and reliability of data are rated at 6 (high).

Two subjects used PDAT-JA to analyze MACOM data while two did not. When questioned, the subjects that did not perform MACOM data analysis stated that there were no MACOM issues to be dealt with during their studies and, therefore, the MACOM analysis function was not used. Post PDAT-JA chart in the table indicates a significant reduction in the time spent on performing MACOM data analysis. However, with only three data points from which to evaluate this analysis step, no practical observations could be made.

MTOE versus TDA data collection and analysis. All evaluation participants performed MTOE versus TDA data collection and analysis. The first chart on Table 6 shows each analyst spends from 15 to 60 hours performing this step and that the step is completed between 1 and 2 times during the analysis process. The total time required for this step ranged from 20 to 120 hours.

Table 4

SQI Data Collection and Analysis

SQI DATA	**PRE PDAT-JA**			
	SUBJECT 1	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	N
Number SQIs	6	4	3	2
Time (Hrs)	4	3	5	
Number of Times	2	2	2	
TIME SPENT	8	6	10	
Rate Data Accuracy (1 - 7)	3	3	6	

SQI DATA	**POST PDAT-JA**			
	SUBJECT 1	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	N
Number SQIs	6	4	3	0
Time (Hrs)	.50	1	.03	0
Number of Times	1	2	2	
TIME SPENT	.50	2	.06	0
Rate Data Accuracy (1 - 7)	7	7	7	

Table 5

MACOM Data Collection and Analysis

	PRE PDAT-JA			
MACOM DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	N	N	Y	N
Time (Hrs)			10	
Number of Times			2	
TIME SPENT			20	
Ra e Data Accuracy (1 - 7)			6	

	POST PDAT-JA			
MACOM DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	N	N	Y	Y
Time (Hrs)			.03	.05
Number of Times			1	2
TIME SPENT			.03	.10
Rate Data Accuracy (1 - 7)			7	7

Table 6

MTOE Versus TDA Data Collection and Analysis

	PRE PDAT-JA			
MTOE vs TDA DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	Y
Time (Hrs)	60	20	15	20
Number of Times	2	2	2	1
TIME SPENT	120	40	30	20
Rate Data Accuracy (1 - 7)	3	4	6	5

	POST PDAT-JA			
MTOE vs TDA DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	Y
Time (Hrs)	1	1	1	.50
Number of Times	1	2	1	2
TIME SPENT	1	2	1	1
Rate Data Accuracy (1 - 7)	7	7	7	7

The rated data accuracy varied from 3 (less than average) to 6 (high).

All subjects also performed this analysis step using PDAT-JA. The Post PDAT-JA chart shows substantial time savings were gained using the software for this analysis function. The average time savings for MTOE versus TDA analysis was 98 percent. Data accuracy was increased to 7 (extremely high).

CONUS versus OCONUS data collection and analysis. As depicted on the first chart of Table 7, only two of the subjects performed CONUS versus OCONUS data collection and analysis in the manual mode. The participants from APG stated that they rarely performed this type of analysis as few if any of the MOSs in their CMF were considered space imbalanced. The remaining participants perform this analysis for all MOSs in their CMF to ensure that no space imbalanced condition exists within the MOS they are working on. Both analysts felt that this analysis step required 20 hours to complete and that the process is usually performed at least twice during position data analysis. The total time required for CONUS versus OCONUS data collection is 40 hours. Data accuracy and reliability ranged from 4 (average) to 6 (high).

The subjects from FLW performed CONUS versus OCONUS data analysis using the PDAT-JA software. The second chart on the table reveals a major decrease in the time required for this analysis process. On average, the time savings between the manual method and that assisted through PDAT-JA was 99 percent. Data accuracy and reliability also increased to 7 (extremely high).

Modifications to TAADS documentation. All evaluation participants made manual modifications to hard copy TAADS documentation. As shown in the Pre PDAT-JA chart on Table 8, the time spent for each iteration of this function ranged from 60 to 360 hours. The number of times this function is performed varies from 2 to 4. The total time spent making modifications to TAADS fluctuated between a low of 160 hours to a high of 720 hours. The accuracy and reliability of the TAADS data after manual modification was rated between a low of 2 (low) and a high of 4 (average).

All four evaluation subjects used PDAT-JA to make modifications to TAADS in the automated environment. The second chart on the table demonstrates a profound time savings in modifying TAADS documentation. The average "Time Spent" performing manual modifications to TAADS by all subjects was 345 hours, while the average of "Time Spent" performing modifications to TAADS using the PDAT-JA software was 80 hours. Performing

Table 7

CONUS Versus OCONUS Data Collection and Analysis

		PRE PDAT-JA		
CONUS vs OCONUS DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	N	N	Y	Y
Time (Hrs)			20	20
Number of Times			2	2
TIME SPENT			40	40
Rate Data Accuracy (1 - 7)			6	4

		POST PDAT-JA		
CONUS vs OCONUS DATA	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	N	N	Y	Y
Time (Hrs)			.50	.04
Number of Times			1	2
TIME SPENT			.50	.08
Rate Data Accuracy (1 - 7)			7	7

Table 8

Modifications to TAADS Documentation

	PRE PDAT-JA			
MODIFICATIONS TO TAADS	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	Y
Time (Hrs)	360	80	80	60
Number of Times	2	2	4	3
TIME SPENT	720	160	320	180
Rate Data Accuracy (1 - 7)	2	4	3	4

	POST PDAT-JA			
MODIFICATIONS TO TAADS	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**
Perform Analysis? (Y/N)	Y	Y	Y	Y
Time (Hrs)	24	24	30	40
Number of Times	2	3	4	2
TIME SPENT	48	72	120	80
Rate Data Accuracy (1 - 7)	7	7	7	7

modifications to TAADS in the automated mode provided an average time savings of 265 hours per subject or 77 percent of the time required to perform this procedure in a manual mode.

Accuracy and reliability of data. The accuracy and reliability of data was also improved through the use of PDAT-JA. On average, accuracy and reliability of data gathered in the manual mode was 4 (average). On the other hand, PDAT-JA assisted analysis increased accuracy and reliability of data to 7 (extremely high). This finding is notable because the increase in accuracy can also be translated into time saved. The increase to extremely high accuracy and reliability means that time is not lost going back over work to find mistakes; and in many cases, repeating entire analytical steps because the errors cannot be found is almost completely eliminated. During the course of position data analysis, elimination of mistakes can mean savings of hundreds of hours, especially for the novice analyst.

Summary of Improvements

Based on the findings described above, there is no question that PDAT-JA enhances the analyst's capability to perform position data analysis. However, since the sample size is small, one must be very careful on making claims of increased efficiency without statistical validation. The only valid comparisons that can be made are those of comparing the time required by each subject to perform position data analysis in the manual mode to the time spent performing analysis assisted by PDAT-JA.

To make this comparison, the total number of hours required by each subject to perform position data analysis in the manual mode was treated as 100 percent of "time required" regardless of the actual time required for analysis. The "time spent" by each subject performing PDAT-JA assisted analysis for the same number of MOS positions was then compared to the "time required".

Figure 3 depicts the comparison. The solid black bars on the chart represent the "time required" for each subject to perform position data analysis manually. The shaded bars represent the "time spent" by the subjects performing analysis using PDAT-JA. In every case, the time saved through the utilization of PDAT-JA is substantial.

Figure 4 provides a representation of the percent of total time saved by each evaluation subject while performing position data analysis using PDAT-JA versus the manual mode. As depicted in the figure, overall time savings ranged between 72 and 95 percent. The savings in time and effort establish the credibility of PDAT-JA as a viable enhancement to the process of position data analysis for those functions described in the PDAT-JA software standards.

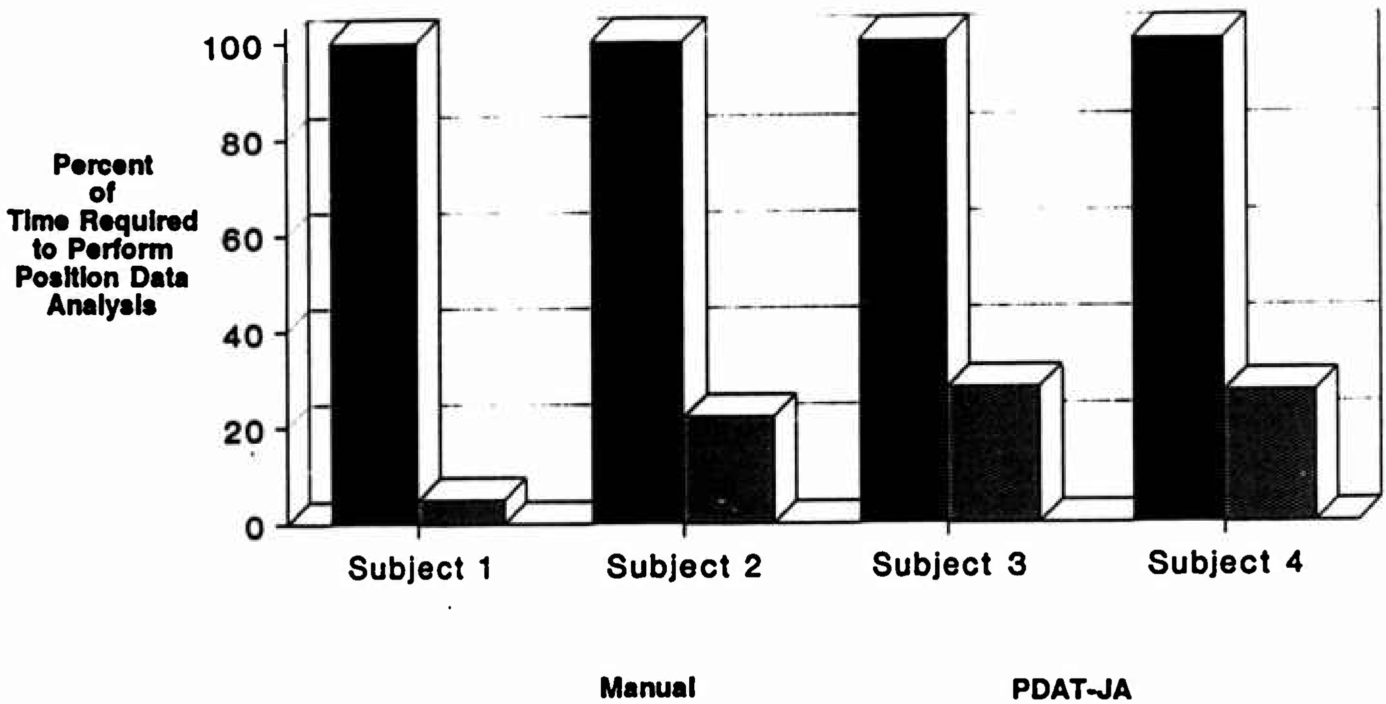

Figure 3. Comparison of manual position data analysis (time required) versus analysis assisted through PDAT-JA (time spent).

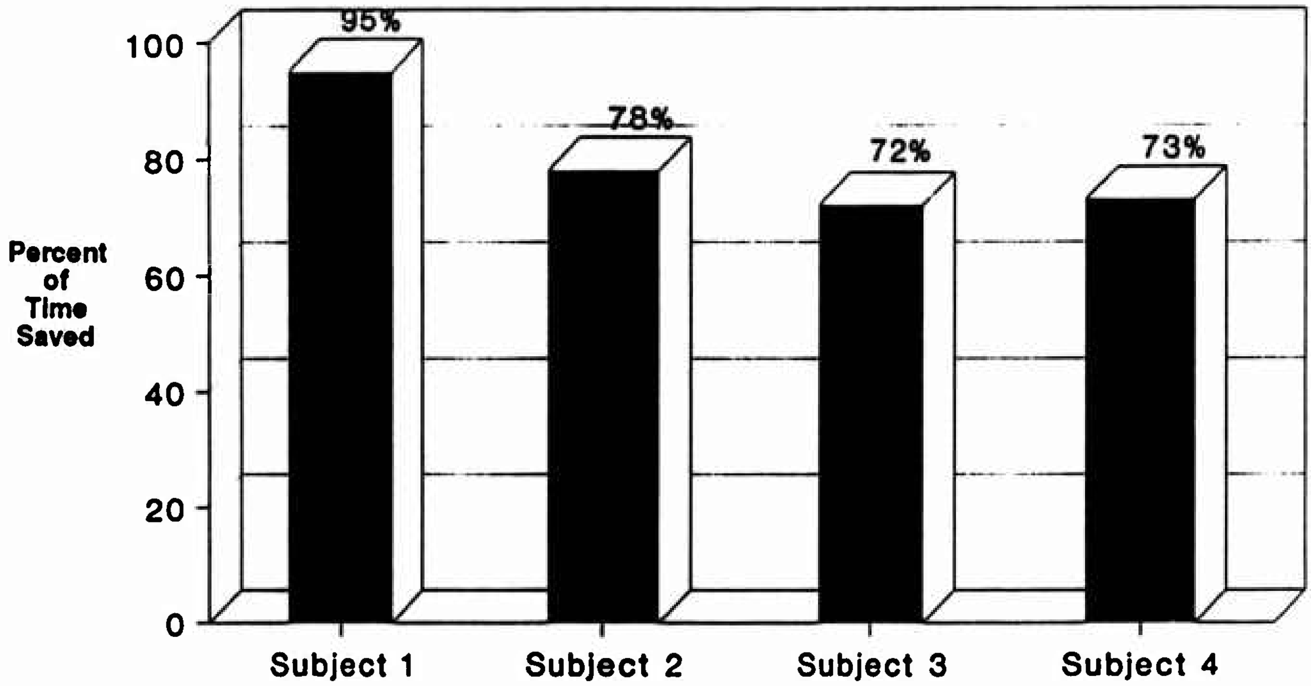

Figure 4. Percent of total time saved through using PDAT-JA.

Recommended PDAT-JA Software Modifications

The purpose of this section is to review the recommended modifications to the PDAT-JA software provided by the evaluation participants. The recommended modifications are evaluated against the criteria and constraints used for developing PDAT-JA. Based upon this evaluation, final software modification recommendations are identified.

Improvements Recommended by Test Users

The following is a discussion of the improvements to the PDAT-JA software recommended by the evaluation subjects from FLW, APG, and FG. Table 9 provides a list of improvements along with the estimated level of effort to perform each.

Recommendation 1: Expand data import capability. The software should be capable of importing data from a magnetic tape and storing the data in a central file server that can be accessed over a mini-computer based local area network. The Signal proponent stated that this type of hardware capability should be considered the standard mode of operation across proponent schools. The rationale for this recommendation is based on the experience of the Signal School that the length of time required to download Headquarters Department of the Army (HQDA) data is considerable. The Signal proponent ordered TAADS data from HQDA on MOSs 31F and 36M. Taken together, these MOSs consist of approximately 1500 authorized positions. The reviewer indicated that a period of two weeks was required to receive the data and that 21 floppy diskettes were needed to store the TAADS data. Once the data were received, the reviewer stated that almost two hours were required to download and process the data using PDAT-JA.

Currently, the Signal Proponent has hardware capability to download TAADS from magnetic tape to a minicomputer. The proponent also uses dBase III+ as their primary data base management software. The reviewer maintains that the data for MOSs 31F and 36M could be downloaded in approximately 40 minutes using dBase III+. Therefore, the use of PDAT-JA, as currently configured, is comparatively time consuming in terms of ordering data from HQDA and downloading the data into a personal computer.

Finding. One of the design objectives for PDAT-JA was that the software operate on Army standard PC equipment and be both exportable and nonproprietary. The current state of the Signal School's computer hardware capability far exceeds that found at other Army schools. During the development of PDAT-JA, several schools were surveyed to determine the current state of hardware

Table 9

Requested Modifications to PDAT-JA

Requested Modifications	Estimated Hours
1. Revise Data Import	20
2. Provide Global MOS Duty Title Replacement	40
3. Increase the Three MOS Analysis Limitation	240
4a. Reduce the Number of Editing Steps Required	40
4b. Remove Editing Window	180
4c. Change Default Settings	20
4d. Remove the "Authorizations Must be Less Than Requirements" Prohibition	*
5. Provide PMAD Data Import and Analysis Capability	200
6. Provide UIC Level Requirements and Authorizations Delete Function	20
7. Provide Global MOS Edit Function	120
Total Estimated Hours	880

* Hours included with 4b.

capability. Some of the schools contacted had no computer capability, while most others had the Army standard system. The only exceptions were the Signal School and the U.S. Army Academy of Health Sciences which both have exceptional capability.

HQDA is sometimes slow responding to requests for TAADS data regardless of what transfer media are requested. However, one must recognize that requests which require data to be downloaded on 5-1/4" diskette as an ASCII file are not currently the standard way data are downloaded by HQDA. Therefore, at least initially, requests may take a little longer to execute.

The requirement for 21 diskettes to download MOSs 31F and 36M cannot be explained. These MOSs are very small and should only require two or three diskettes for storage. However, one might speculate that the download contained more TAADS data than requested (e.g., the entire CMF rather than the requested MOSs).

During the data import process, PDAT-JA is designed to condition data as it is being read into the data base. The conditioning process ensures that incomplete data or data that do not contain proper MOS coding are not read into the PDAT-JA data base. To compare PDAT-JA's time to perform this task with that of dBase III+, which only reads the data into a data base without the same data conditioning, analysis, or report file generation, is not a valid comparison.

A less significant data import modification emerged from the evaluation. This entails providing the capability to function with additional disk drive designators besides the conventional A:\ and C:\ disk drives within PDAT-JA's import function. This modification can easily be accomplished and would have general applicability throughout the user community.

<u>Implementation evaluation</u>. The Signal proponent's recommendation would lead to a customization of the PDAT-JA software that exceeds the design guidelines for the software. In order for PDAT-JA to download data from a non-formatted 9-track tape, a transport and interface card are necessary and specialized software is required. Additionally, a FOXPro interface software program which pre-processes the data from the tape would also be required. However, as the state of capability evolves and bigger and better computers are installed throughout the Army, this recommendation may need to be reassessed.

On the other hand, adding additional drive designators is a modification than can easily be accomplished with minimal effort. The change would essentially involve redesign of the effected data import screens and involve an estimated 20 hours.

Recommendation 2: Provide global MOS duty title replacement. Reviewers at FG and FLW recommended that PDAT-JA be given the capability to globally replace MOS information in the TAADS worksheet rather than having to make individual changes to each line of data. The rationale for this recommendation is that in many cases an MOS action will involve a title change, often consisting of only one phrase or word. Since PDAT-JA requires each line of data to be individually edited and updated, the reviewers felt the process was too time-consuming.

Finding. A global replacement capability is needed to reduce the time spent performing repetitive changes to TAADS data while editing the PDAT-JA TAADS worksheet. For example, one function could be to change all MOS titles based on a particular grade or duty title.

Implementation evaluation. A global replacement capability can be developed for PDAT-JA keyed on MOS, duty title, and grade. However, replacement of all titles would be made by matching the exact spelling of the title specified by the user. Therefore, if titles exist in several forms in TAADS (words abbreviated or even misspelled), a global replacement would require all variations of the original title to be entered. For example, USA and U.S.A. and UAS, if a typographical error existed in the original data, would need to be entered by the user to effect the replacement. A menu option could be added to the existing program to provide this feature.

Recommendation 3: Increase the three MOS analysis limitation. Currently, PDAT-JA provides analysis and worksheet development capability for three MOSs. Reviewers at FG and FLW stated that MOS consolidation actions could easily require the analysis of more than three MOSs during a restructuring action and therefore this limitation should be removed.

Finding. The analysis and TAADS worksheet capabilities of PDAT-JA were intentionally limited to three MOSs because of hardware data storage constraints. On average, the Army standard PC has only 20 Mbytes of storage capacity on a single hard drive. PDAT-JA is designed to read into its data base both the target MOS authorizations and all other MOS authorizations that reside in the same TAADs paragraph as the target MOS. Therefore, the number of MOS authorizations in the original TAADS data must be limited to approximately 5000 authorizations. PDAT-JA performs analysis and writes files for use in report generation; these files take up space on the hard disk. Additionally, PDAT-JA allows the user to develop an automated worksheet that is an exact duplicate of the original data downloaded during the import process. This worksheet is used by the analyst to make changes to TAADS based on a new or revised SGA. The worksheet takes up

additional space on the disk equal to that of the original data. Given this, the developers of PDAT-JA limited the number of MOSs the software would accept to three, and set the recommended maximum MOS authorizations at 5000 as a way of protecting the user from potential system failure associated with hardware constraints.

Implementation evaluation. Given the hardware limitations of the current Army standard PC, action on this recommendation should be deferred until hardware capabilities and storage capacities are upgraded. As a rule-of-thumb, the Army standard PC system would need to be upgraded to at least an 80386 central processing unit and 60 Mbytes of internal storage capacity before considering an upgrade of the software to accept a larger number of MOSs. Further, many of PDAT-JA's input and display screens as well as a significant amount of the programming and reports are based on a three-MOS input and data analysis limit. To change this code, would require significant modifications throughout almost every aspect of the program.

Recommendation 4: Modify PDAT-JAs editing mode. The FG reviewer made four recommendations for modifying PDAT-JA capabilities to edit the PDAT-JA TAADS Worksheet. These recommendations are discussed separately.

4a. Reduce the number of editing steps required. The reviewer recommended that the number of steps required to perform editing be reduced. When editing a worksheet, the analyst must move from the data base window to the worksheet window, call up the editing window, make changes in the editing window to the worksheet, and exit the editing window when the changes are complete. To the reviewer, this process is overly cumbersome and time consuming.

Finding. The number of steps required to perform work in the editing mode is a bit cumbersome and time consuming. In part, the problem is one of getting used to the software. On the other hand, software design plays a role in this issue. The editing window is designed to reduce the probability of making mistakes. This is accomplished through a series of checks and balances programmed into the edit feature of PDAT-JA for quality control purposes. For example, the edit program examines the analyst's input to ensure that paygrade and skill level match. Additionally, the program will not allow the analyst to exit the edit mode unless the TAADS paragraph being edited is in balance. This feature is executed by ensuring that the total of the MOS authorizations revised by the analyst do not exceed the total number of original MOS authorizations.

Without the preprogrammed checks and balances, the analyst can make mistakes while editing and not have any indication an error was made. The time spent performing these extra steps while in the edit mode can save hours of back tracking through the worksheet looking for mistakes.

__Implementation evaluation__. PDAT-JA can be reprogrammed so that the editing feature is not so cumbersome. However, to do this would necessitate the removal of the preprogrammed quality control features or the addition of a separate editing mode without a quality control feature.

__4b. Remove editing window__. The editing window covers the TAADS window on the screen when in the editing mode and thus TAADS cannot be referred to when editing. The FG reviewer recommends that the editing window be removed and that editing be allowed in the TAADS worksheet.

__Finding__. The editing window does obstruct the analyst view of the TAADS window. However, to remove the editing window would result in the same impact as outlined in 4a above.

__Implementation evaluation__. The editing window can be removed and provisions made to directly edit the TAADS worksheet. However, this would also result in the loss of the quality control features designed into PDAT-JA. For the inexperienced analyst, removal of the editing window would provide the likelihood of making unrecoverable mistakes as no safeguards would be in place.

One solution could be to provide a menu option to select editing through the editing window or editing within the worksheet window. However, because of radical differences between these two methods, difficulties would arise when users try to switch from one method to the other. Another option might be to simply reposition the editing window to allow a full view of the original data base window.

__4c. Change default settings__. When exiting from the editing window, PDAT-JA returns the user to the TAADS window and not the worksheet. The reviewer recommends that since the worksheet contains the data being edited, the program should default to the worksheet when exiting the edit mode.

__Finding__. PDAT-JA is designed to default to the TAADS window rather than the worksheet. Most data base management systems require the user to **SAVE** changes before the data base is actually updated. Likewise, PDAT-JA also requires a **SAVE** command be executed before the worksheet is actually updated. The software executes a **SAVE** by taking the user out of the worksheet editing

mode back to the TAADS window. The PDAT-JA TAADS data base and the TAADS worksheet are linked in terms of movement through the data bases. Another reason that PDAT-JA defaults to the TAADS window is that the worksheet is keyed on the TAADS data base by the use of data hooks. These data hooks allow the user to select a unit identification code (UIC) and paragraph in the TAADS window and the software automatically advances the worksheet to the same UIC and paragraph. Without this feature comparisons between the original TAADS data and the worksheet could not be made.

Implementation evaluation. The default to the TAADS window is required when exiting the editing window in order to execute a **SAVE** and for the program to "refind" its place in the TAADS worksheet. However, this step can be made transparent to the user by adjusting the program to return automatically to the TAADS worksheet once the SAVE and "refind" commands have been executed.

4d. Remove the "authorizations must be less than requirements" prohibition. The software is programmed to prohibit MOS requirements from being less than MOS authorizations at the paragraph level of detail. The FG reviewer recommended that this limitation be revised to allow authorizations and requirements imbalances at the paragraph level but not at the UIC level.

Finding. A capability to allow MOS requirement and authorization imbalances at the paragraph level is needed to accommodate Signal's unique operational requirements, although regulatory guidance expressly forbids documented authorizations to exceed requirements except under two very narrow exceptions (see Army Regulation (AR) 310-49, The Army Authorization Documents System, Chapter 3, Para 3-4).

Implementation evaluation. PDAT-JA can be reprogrammed to allow requirements to exceed authorizations. Although this modification can be accomplished, one must question the wisdom of designing software based on an exception rather than the rule.

Recommendation 5. Provide PMAD data import and analysis capability. The FG reviewer recommended that PDAT-JA be furnished with the capability to import and analyze Personnel Management Authorization Document (PMAD) data. The rationale for this recommendation is that the use of PMAD data is necessary for planning future force structure changes. SGA revisions, MOS mergers, and MOS restructures are performed based on what the force structure is projected to be in the out-years rather than on what exists now or in the immediate future.

Finding. Position data analysis requires comparison between TAADS and PMAD data for the purposes of identifying increases or decreases in projected MOS authorizations. This capacity would enhance the capability of PDAT-JA by providing the user with a facility to identify MOS authorization variance, documenting the units in which variance occurs, and for prompting determination of the causes for variance.

Implementation evaluation. The capability to import and compare PMAD data with TAADS was within the scope of the original PDAT-JA effort. However, PMAD data were not available in the format needed for import into PDAT-JA. In lieu of the PMAD capability, other features were added to the software that were not in the original specifications. If data are now available, the PMAD comparison function could be added to PDAT-JA within the scope of this effort.

Recommendation 6. Provide UIC level requirements and authorizations delete function. APG recommends that a function that would permit the removal of MOS requirements and authorizations at the UIC level be added. This function should allow specific UICs to be entered into PDAT-JA and the requirements and authorizations to be zeroed out automatically.

Finding. This function is needed to provide a way to remove requirements and authorizations from units that are not projected to be in the force structure in the out-years. Once the requirements and authorizations for UICs that are not programmed are removed, position data analysis and SGA development can be accomplished based on the projected rather than current force structure. This capability is important as MOS actions must address future as well as current requirements.

Implementation evaluation. A capability to delete requirements and authorizations at the UIC level can be accomplished with minimal effort as a menu option in the MPCTAADS worksheet.

Recommendation 7. Provide global MOS edit function. APG recommends that the software have capability to perform global changes to MOS specifications. For example, replace MOS 91B, 91C, and 91D, with MOS 91E. This function would replace only the first three alpha numeric characters of the MOS code and not change any other characters in the MOS data set.

Finding. A global replacement capability is needed to reduce the time spent performing repetitive MOS data changes while editing the MPCTAADS worksheet.

__Implementation evaluation__. This recommendation could be implemented by creating a separate menu option that will provide this capability in the import data function of the software. This would allow the global replacement of the first three characters of MOS codes prior to performing analysis on the data.

__Modifications to the PDAT-JA Users Manual__. Depending on which software changes are selected, the PDAT-JA Users Manual will be modified accordingly. No modifications to the manual were recommended by the evaluation subjects.

__Final Software Modification Recommendation__

Because the level of effort currently available for improving PDAT-JA is limited, the best solution would be to implement a combination of recommendations which provide the greatest payoff to the Army as a whole within those funding constraints. Based on those criteria, recommendations 1, 2, 6, and 7 are selected as ones to be executed. This combination of recommendations can be accomplished within the allotted effort and provide Army-wide benefits. Items 2, 6, and 7 will provide a more global editing capability. Item 1 would allow users to more easily access data from sources having different disk drive designators.

Future Efforts

PDAT-JA software is a prototype that was developed to establish the feasibility of producing automated methods to support MOS restructuring. This feasibility and the demonstrated usefulness of the prototype suggest that the Army may want to consider expanding the operational capabilities of the PDAT-JA. These options include developing position data analysis capabilities for (1) active duty officers, warrant officers, and civilians; and (2) the reserve component and the National Guard.

Capability to Import and Analyze Active Duty Officer, Warrant Officer, and Civilian Data

Currently, PDAT-JA can only import and perform analysis on enlisted personnel data. In terms of prototype development this capability was adequate to demonstrate how such a capability would operate. For the purpose of designing and developing the prototype software, enlisted data were chosen because enlisted MOS restructuring actions are the preponderance of work accomplished in personnel proponent agencies.

Officer, warrant officer, and civilian specialties also require restructuring in the same manner as the enlisted force. Capability to support officer, warrant officer, and civilian actions is needed in order for the proponent to perform analysis on the entire active Army force structure. Although the current capabilities of PDAT-JA represent an important step forward in reducing the workload of the proponents, thousands of hours will continue to be wasted if officer, warrant officer, and civilian position data analyses are not automated.

Capability to Import and Analyze Reserve Component and National Guard Data

PDAT-JA as currently designed will only import and analyze data on the active component of the Army. During the process of an MOS restructuring action, the personnel proponents must also perform position data analysis on reserve component and National Guard data to identify and assess the effects of a restructuring action. This analysis is conducted using methods identical to those used for the active force. If anything, the time required for analysis of the reserve components is even higher than that of the active force as the reserve components constitute almost two thirds of the total Army force structure. If projected across all personnel proponent agencies, automation of reserve and National Guard position data analysis could potentially save thousands of hours per year.

Further Evaluation of PDAT-JA

The anecdotal results of this evaluation demonstrate that PDAT-JA promises to be a very robust and indispensable asset to the personnel proponent community. If continued use of this prototype confirms the results of this effort, a very strong case could be made for full-scale development and fielding of PDAT-JA.

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Acronyms

AGM	Average Grade Distribution Matrix
APG	Aberdeen Proving Ground
AR	Army Regulation
ARI	Army Research Institute
ASI	Additional Skill Identifier
CONUS	Continential United States
FG	Fort Gordon
FLW	Fort Leonard Wood
HQDA	Headquarters Department of the Army
MACOM	Major Army Command
MOS	Military Occupational Specialty
MTOE	Modified Table of Organization and Equipment
OCONUS . . .	Outside Continental United States
PC	Personal Computer
PDAT-JA . . .	Position Data Analysis Job Aid
PMAD	Personnel Management Authorization Document
SGA	Standards of Grade
SIMOS	Space Imbalanced MOS
SQI	Specialty Qualification Identifier
TAADS	The Army Authorization Documents System
TDA	Table of Distribution and Allowances
UIC	Unit Identification Code

APPENDIX A

SCENARIO

You are to use PDAT-JA to assist you in performing position data analysis on up to three MOSs which contains from 3,000 to 5000 authorized positions. You will first analyze TAADS data based on the current MOS(s) force structure. You will make modifications to the MOS(s) force structure and perform position data analysis to ascertain what changes occurred as a result of your modifications. You are to respond to the questions based only on the steps performed in position data analysis. Time or effort spent in performance of SGA development, personnel data analysis, physical demands analysis, etc., are not to be considered in your response.

There are five basic tasks required in this scenario. However, both Tasks 4 and 5 must be performed twice (once for TAADS data and once for modified TAADS data) to complete one position data analysis cycle. Please use the PDAT-JA Users Manual to help you complete each task.

Task 1: Install PDAT-JA. PDAT-JA will be installed on the personal computer (PC) using the installation and start-up procedures as described in the PDAT-JA Users Manual.

Task 2: Import TAADS data and create the reference data base. Use PDAT-JA to import TAADS MOS data and create the **"PCTAADS Reference"** data base. It is recommended that up to three MOS(s) with a maximum of 5000 authorized positions be used for this task. MOS(s) with more authorizations could exceed the data storage capacity of the PC or make it to difficult to perform all the tasks required in this scenario.

Task 3: Create an MPCTAADS worksheet and modify MOS force structure data. Create the **"MPCTAADS Worksheet"** using the instructions in the Users Manual. Use the worksheet to modify data on a minimum of 3000 authorized positions.

Task 4: Generate summary reports. Use PDAT-JA to perform analysis on both PCTAADS and MPCTAADS data. Upon completion of analysis, generate the following reports:

- Summary of MOS Authorizations by Grade;
- Summary of Additional Skill Identifier (ASI) Authorizations by Grade;
- Summary of Specialty Qualification Identifier (SQI) Authorizations by Grade;

- Summary of Major Army Command (MACOM) MOS Authorizations by Grade;

- Summary of MOS Authorizations, Modified Table of Organization and Equipment (MTOE) versus Table of Distribution and Allowance (TDA) by Grade;

- Summary of MOS Authorizations, Continental United States (CONUS) versus Outside of Continental United States (OCONUS) by Grade;

- MOS Profile Status Report;

- PCTAADS and MPCTAADS Data Base Reports; and

- PCTAADS and MPCTAADS Comparative Report.

Task 5: Perform grade structure analysis. Use PDAT-JA to perform grade structure analysis on both PCTAADS and MPCTAADS data and produce graphic representations of both the MOS grade structure and the percent delta between the MOS and the Army's Average Grade Distribution Matrix.

If you were not able to complete all tasks in the time allotted, please inform the interviewer of how much work was completed and the reasons for not completing the scenario. If the scenario was not completed, please respond to the questionnaire based only upon the portion of tasks you were able to accomplish.

APPENDIX B

AUTOMATED POSITION DATA ANALYSIS
INTERVIEW GUIDE

Date ________________

Name ____
(First) (M.I.) (Last)

Military Rank or Civilian Pay Grade ________

MOS or Civilian Job Series ____

Time as MOS Analyst in Months ____

Number of MOS Actions Completed ____

NOTE FOR THE EVALUATION PARTICIPANTS

Because PDAT-JA represents a prototype system, the developers are extremely interested in the input of MOS analysts who use the software in performing position data analysis. To assist in gathering this data, the developers have included a pre-formatted questionnaire addressing basic topics that effect the useability and effectiveness of the software. Once you have familiarized yourself with PDAT-JA, and have used it for at least four weeks to analyze position data, the developers will return to interview you and complete the questionnaire. In the mean time however, please feel free to use this questionnaire as a guide while performing your evaluation.

Thank you in advance for your participation in the development of this vital personnel proponent tool.

INSTRUCTIONS

Responses to all the questions in this questionnaire should be based on the following scenario. If the scenario does not completely fit the MOS(s) you are performing analysis on, please approximate the answers based on your experience. Please perform the scenario described below to the maximum extent possible. You will be interviewed in about four weeks on your experiences and the questionnaire completed by the person conducting the interview.

When responding to questions that ask you to rate data accuracy and reliability, please rate them using this scale:

1 - Very Low Accuracy and Reliability
2 - Low Accuracy and Reliability
3 - Less Than Average Accuracy and Reliability
4 - Average Accuracy and Reliability
5 - More Than Average Accuracy and Reliability
6 - High Accuracy and Reliability
7 - Extremely High Accuracy and Reliability

SECTION 1
PDAT-JA Assisted Position Data Analysis

1. **Application of the Army's Average Grade Distribution Matrix (AGM)**

   a. Did you apply AGM to assess the career progression and stability of the MOS(s) during position data analysis?

      YES ______
      NO ______

   If YES, please give the average number of times ____________

   If NO, please explain: ______________________________________

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   b. On average, how long (in mins.) did it take you to apply the AGM to an MOS using PDAT-JA? ______________________

   c. Once you developed an SGA for a merge or restructure action and applied it to an MOS(s) averaging 5,000 positions, on average, how long did the computer take to perform the analysis required to be able to apply the AGM to the modified structure? ___________

   d. How would you rate the accuracy and reliability of the AGM data provided by PDAT-JA?

      Circle One: 1 2 3 4 5 6 7

   e. On average, how many times did you modify TAADS and perform analysis of modified MOS positions to attain the proper grade structure? ________________________________

2. **ASI Data Collection**

   a. Did you summarize ASI Authorizations by Grade when performing position data analysis?

      YES ______
      NO ______

If YES, how many ASI(s) were associated with the MOS(s) you were analyzing? ______

If YES, how long did it take for the computer to perform analysis necessary to gather the ASI data? ______

If NO, please explain: ________________________________

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b. Did you also perform ASI analysis after application of a new or revised SGA?

YES ______
NO ______

If YES, how many times? ________

c. How would you rate the accuracy and reliability of the ASI data provided by PDAT-JA?

Circle One: 1 2 3 4 5 6 7

3. **SQI Data Collection**

a. Did you summarize SQI Authorizations by Grade when performing position data analysis?

YES ______
NO ______

If YES, how many SQI(s) were associated with the MOS(s) you were analyzing? ______

If YES, how long did it take for the computer to perform analysis necessary to gather the SQI data? ______

If NO, please explain: ________________________________

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b. Did you also perform SQI analysis after application of a new or revised SGA?

YES ______
NO ______

If YES, how many times? ________

c. How would you rate the accuracy and reliability of the SQI data provided by PDAT-JA?

Circle One: 1 2 3 4 5 6 7

4. **MACOM Data Collection**

a. Did you summarize Major Army Command (MACOM) MOS authorizations by grade?

YES ______
NO ______

If YES, how long did it take for the computer to perform the analysis necessary to gather MACOM data? ______

If NO, please explain: ______________________________

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b. Did you also perform MACOM analysis after application of a new or revised SGA?

YES ______
NO ______

If YES, how many times? ________

c. How would you rate the accuracy and reliability of the MACOM data provided by PDAT-JA?

Circle One: 1 2 3 4 5 6 7

5. **TOE Versus TDA Data Collection**

a. Did you summarize MOS authorizations TOE versus TDA by grade?

YES ______
NO ______

If YES, how long did it take the computer to perform the analysis necessary to gather TOE versus TDA data?

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If NO, please explain: ______________________________

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b. Did you also perform TOE versus TDA analysis after application of a new or revised SGA?

YES ______
NO ______

If YES, how many times? ________

c. How would you rate the accuracy and reliability of the TOE versus TDA data provided by PDAT-JA?

Circle One: 1 2 3 4 5 6 7

6. **CONUS Versus OCONUS**

a. Did you summarize MOS authorizations CONUS versus OCONUS by grade?

YES ______
NO ______

If YES, how long did it take the computer to perform the analysis necessary to gather CONUS versus OCONUS data?

______

If NO, please explain: ______________________________

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b. Did you also perform CONUS versus OCONUS analysis after application of a new or revised SGA?

YES ______
NO ______

If YES, how many times? ________

c. How would you rate the accuracy and reliability of the CONUS versus OCONUS data provided by PDAT-JA?

Circle One: 1 2 3 4 5 6 7

7. **Modifications to TAADS Documents**

a. Did you make changes to the MOS(s) data on the automated TAADS worksheet based on new or revised SGA?

YES ______
NO ______

If YES, for up to three MOS(s) containing an average of 5,000 positions, how long did it normally take you to accomplish this task? ________________

If NO, please explain: ________________________________

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b. On average, how many times did you perform this task?

______

c. How would you rate the accuracy and reliability of the data provided by PDAT-JA once you entered your modifications?

Circle One: 1 2 3 4 5 6 7

SECTION 2
PDAT-JA Users Evaluation Questionnaire

1. Input and Output Devices

a. Did the keyboard provide you with the speed and accuracy needed to input data for performing position data analysis?

YES ________
NO ________

If NO, please explain: ______________________________

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b. Do you feel that another type of control such as a mouse, would be better?

YES ________
NO ________

If YES, what type and why: ______________________________

____

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b. Can the information on the screen displays be easily read and interpreted?

YES ________
NO ________

If NO, what causes the difficulty? ______________________

____

____

What would make it easier? ______________________________

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2. Data Display

a. Do you always have enough information on the screen to perform the actions required in each step of analysis supported by PDAT-JA?

YES ________
NO ________

If NO, please explain: ______________________________

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b. Are there ever times when the information presented is more than you used?

YES _______
NO _______

If YES, when? ______________________________

Does this interfere with performing your job? Please explain:

____

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c. Is the organization of information displayed on the screen helpful for doing your job?

YES _______
NO _______

If NO, what would you change and why? ______________________

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d. Have you ever found information coding (highlighted displays) to be a problem?

YES _______
NO _______

If YES, when? ____________________

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e. Do the charts used in this system ever confuse you?

YES ______
NO ______

If YES, which ones? Why? ____________________

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f. Is there anything that you would like see changed or added to software?

YES ______
NO ______

If YES, Please explain: ____________________

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3. **User Input**

a. Have you ever had any problems entering data into the MPCTAADS Worksheet?

YES ______
NO ______

If YES, when? Please explain: ____________________

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b. Would you change anything about the way the system requires you to enter data?

YES _______
NO _______

If YES, please explain: ____________________________________

4. **Feedback and Error Handling**

a. Are the displayed messages such as the ones provided when editing a worksheet, ever confusing or difficult to remember?

YES _______
NO _______

If YES, please explain: ____________________________________

b. Do error messages give you enough information to correct your errors?

YES _______
NO _______

If NO, please explain: ____________________________________

c. **Is there anything about the way the system handles errors or provides feedback that you would change?**

Please explain: ______________________________

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d. **Can you always correct data entry errors that you have made?**

YES ________
NO ________

If NO, please explain: ______________________________

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e. **Can you always return to your place in the program after seeking help (pressing the F1 function key)?**

YES ________
NO ________

If NO, Please explain: ______________________________

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5. **Interactive Control**

a. **Are the menus formatted so that you can quickly and easily select options?**

YES ________
NO ________

If NO, please explain: ________________________________

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b. Can you always retrieve the information you need from the computer data base?

YES ______
NO ______

If not, please explain: ________________________________

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c. Have you ever had any problems moving or positioning the cursor?

YES ______
NO ______

If YES, when? ________________________________

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6. **Command Methods**

a. Are the instructions you must provide to the computer to initiate an action (**Enter**, **Cancel**, **Escape**, +, -, etc.) confusing or difficult to use?

YES ______
NO ______

If YES, when? ____________________

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b. Are there additional computer commands that would assist you in performing position data analysis?

YES ______
NO ______

If YES, please explain: ____________________

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c. Are there computer commands available that are repetitive or not needed to accomplish your job?

YES ______
NO ______

If so, what are they? ____________________

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7. **General**

Are there any other comments regarding the usability of the computer interface of PDAT-JA that you would like to make?

YES ______
NO ______

If YES, what are they? ______

SECTION 3
Users Manual Questionnaire

1. **Installation and Start-Up Procedures**

   Do the procedures provide you with enough information to perform install the software and begin running PDAT-JA?

   YES ________
   NO ________

   If NO, please explain: ____

   ____

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   ____

2. **Jump Start**

   Does the "JUMP START" section provide you with enough information to operate the system and enable you to import TAADS data, perform analysis, develop and annotate worksheets, and produce reports?

   YES ________
   NO ________

If NO, please explain: ____

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3. **Summary of System Concepts and Reports Production**

   a. Do the system concepts provided in " A VIEW FOR THE ANALYST" supply enough information to provide a basic knowledge of what phases of position data analysis PDAT-JA is designed to support?

   YES ________
   NO ________

If NO, please explain: ____________________

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b. Does the section also provide enough information on the types and purposes for the reports provided by PDAT-JA?

YES ______
NO ______

If NO, Please Explain: ____________________

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4. **Description of System Operation**

a. Is the information provided in the "DETAILED DESCRIPTION OF OPERATION" precise enough for you to execute all the operations and functions of PDAT-JA?

YES ______
NO ______

If NO, Please explain: ____________________

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____

b. Are there places where the information presented is more than you need to perform the task?

YES ______
NO ______

If YES, please explain: ____

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c. Is the organization of the material presented in the manual helpful for doing your job?

YES ______
NO ______

If NO, please explain: ____

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d. What would you change and why? ______________________________

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APPENDIX C

PDAT-JA BASELINE EVALUATION INTERVIEW GUIDE

Date ______________

Name ____
(First) (M.I.) (Last)

Military Rank or Civilian Pay Grade ________

MOS or Civilian Job Series ______________________________

Time as MOS Analyst in Months ______________________________

Number of MOS Actions Completed ______________________________

EVALUATION OF POSITION DATA ANALYSIS PERFORMED IN A MANUAL MODE

Answer to all questions should be based on the following scenario. If the scenario does not fit any MOS action you have previously performed analysis on, please approximate your answers based on your experience.

When responding to questions that ask you to rate data accuracy and reliability, please rate them using this scale:

1 - Very Low Accuracy and Reliability
2 - Low Accuracy and Reliability
3 - Less Than Average Accuracy and Reliability
4 - Average Accuracy and Reliability
5 - More Than Average Accuracy and Reliability
6 - High Accuracy and Reliability
7 - Extremely High Accuracy and Reliability

SCENARIO:

You are performing position data analysis on an MOS restructure or merger action which contains 5,000 authorized positions. You will first analyze TAADS data base on the current force structure. Then you will make modifications to the force structure on TAADS and perform position data analysis to ascertain what changes occurred as a result of your modifications. You are to respond to the questions based only on the steps performed in position data analysis. Time or effort spent in performance of SGA development, personnel data analysis, physical demands analysis, etc., are not to be considered in your response.

BASELINE EVALUATION
Position Data Analysis

1. **Application of the Army's Average Grade Distribution Matrix (AGM)**

   a. Do you apply AGM to assess the career progression and stability of the MOS(s) during position data analysis?

   YES _____
   NO _____

   If YES, please give the average number of times ___________

   If NO, please explain: ________________________________

   ____

   ____

   ____

   ____

   b. On average, how long (in mins.) does it take you to apply the AGM to an MOS? ____________________

   c. Once you have developed an SGA and applied it to one or more MOS(s) totaling 5,000 positions, on average, how long does it take you to perform the grade structure counts required to be able to apply the AGM to the modified structure? ___________

   d. How would you rate the accuracy and reliability of the data obtained by manual counts?

   Circle One: 1 2 3 4 5 6 7

   d. On average, how many times must you modify TAADS and perform counts of modified MOS positions to attain the proper grade structure? ____________________

2. **ASI Data Collection**

   a. Do you summarize ASI Authorizations by Grade when performing position data analysis?

   YES ______
   NO ______

b. If YES, how many ASI(s) are associated (on average) with the MOS(s) in your CMF? ______

c. If YES, how long does it take for you to perform the counts necessary to gather the ASI data? ______

d. If NO, please explain: ______________________________

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____

e. Do you also perform these counts after application of a new or revised SGA?

YES ______
NO ______

f. How would you rate the accuracy and reliability of the ASI data obtained by manual counts?

Circle One: 1 2 3 4 5 6 7

3. **SQI Data Collection**

a. Do you summarize SQI Authorizations by Grade when performing position data analysis?

YES ______
NO ______

b. If YES, how many SQI(s) are associated (on average) with the MOS(s) in your CMF? ______

c. If YES, how long does it take for you to perform the counts necessary to gather the SQI data? ______

d. If NO, please explain: ______________________________

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e. Do you also perform these counts after application of a new or revised SGA?

YES ______
NO ______

f. How would you rate the accuracy and reliability of the SQI data obtained by manual counts?

Circle One: 1 2 3 4 5 6 7

4. **MACOM Data Collection**

a. Do you summarize Major Army Command (MACOM) MOS authorizations by grade?

YES ______
NO ______

b. If YES, how long does it take for you to perform the counts necessary to gather MACOM data? ______

c. If NO, please explain: ______________________________

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d. Do you also perform the counts after application of a new or revised SGA?

YES ______
NO ______

e. How would you rate the accuracy and reliability of the MACOM data obtained by manual counts?

Circle One: 1 2 3 4 5 6 7

5. **TOE Versus TDA Data Collection**

a. Do you summarize MOS authorizations TOE versus TDA by grade?

YES ______
NO ______

b. If YES, how long does it take for you to perform the counts necessary to gather TOE versus TDA data? ________

c. If NO, please explain: ______________________________

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d. Do you also perform the counts after application of a new or revised SGA?

YES ______
NO ______

e. How would you rate the accuracy and reliability of the TOE versus TDA data obtained by manual counts?

Circle One: 1 2 3 4 5 6 7

6. **CONUS Versus OCONUS**

a. Do you summarize MOS authorizations CONUS versus OCONUS by grade?

YES ______
NO ______

b. If YES, how long does it take for you to perform the counts necessary to gather CONUS versus OCONUS data?

______

c. If NO, please explain: ______________________________

____

____

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____

d. Do you also perform the counts after application of a new or revised SGA?

YES ______
NO ______

e. How would you rate the accuracy and reliability of the CONUS versus OCONUS data obtained by manual counts?

Circle One: 1 2 3 4 5 6 7

7. **Modifications to TAADS Documents**

a. Do you make pen and ink changes to MOS data on TAADS based on new or revised SGA?

YES ______
NO ______

b. If YES, for up to three MOS(s) containing an average of 5,000 positions, how long does it normally take you to accomplish this task? _____

c. If NO, please explain: ______________________________

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____

____

____

d. On average, how many times must you perform this task?

______

e. How would you rate the accuracy and reliability of the manually modified data?

Circle One: 1 2 3 4 5 6 7